9-30 WATER DISTRIBUTION MATERIALS

This Specification addresses pipe and appurtenances 16-inches in diameter and smaller. Water distribution material incorporated in the Work shall be new.

The Contractor shall provide to the Engineer the names of the manufacturer(s) of the water distribution materials proposed for inclusion in the Work, which materials shall conform in every respect to these Specifications. If so required by the Special Provisions, the Contractor shall provide to the Engineer in addition to the names of the manufacturer(s) of the water distribution materials, a Manufacturer's Certificate of Compliance meeting the provisions of Section 1-06.3, for the materials proposed for inclusion in the Work. As used in this Specification, the term "lot of material delivered to the Work" shall mean a shipment of the water distribution materials as it is delivered to the Work.

The Engineer shall have free access to all testing and records pertaining to material to be delivered to the job site. The Engineer may elect to be present at any or all material testing operations.

9-30.1 Pipe

All pipe shall be clearly marked with the manufacturer's name, type, class, and thickness as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.

9-30.1(1) Ductile Iron Pipe

1. Ductile iron pipe shall be centrifugally cast and meet the requirements of AWWA C151. Ductile iron pipe shall have a cement mortar lining meeting the requirements of AWWA C104. Ductile iron pipe to be joined using bolted flanged joints shall be Standard Thickness Class 53. All other ductile iron pipe shall be Standard Thickness Class 50 or the thickness class as shown in the Plans.
2. Nonrestrained joints shall be rubber gasket, push on type, or mechanical type meeting the requirements of AWWA C111.
3. Restrained joints shall be as specified in Section 9-30.2(6).

9-30.1(2) Polyethylene Encasement

Polyethylene encasement shall be tube-form meeting the requirements of ANSI/AWWA C105 and shall be high-density, cross-laminated polyethylene film, natural or black color.

9-30.1(3) Vacant

9-30.1(4) Steel Pipe

9-30.1(4)A Steel Pipe (6-inches and Over)

Steel pipe 6-inches in diameter and larger shall conform to AWWA C200. The type of protective coating and lining and other supplementary information required by AWWA C200 shall be included in the Special Provisions.

9-30.1(4)B Steel Pipe (4-inches and Under)

Steel pipe 4-inches in diameter and smaller shall be hot-dip galvanized inside and out and meet the requirements of ASTM A 53.

9-30.1(5) Polyvinyl Chloride (PVC)

9-30.1(5)A Polyvinyl Chloride (PVC) Pipe (4-inches and Over)

PVC pipe for water mains shall meet the requirements of ANSI/AWWA C900 or ANSI/AWWA C905. PVC pipe shall have the same outside dimensions as ductile iron pipe. PVC pipe for distribution pipelines shall be a minimum of SDR 18. Pipe shall be listed by Underwriters' Laboratories, Inc.

PVC pipe shall be considered flexible conduit. Joints shall meet the requirements of ASTM D 3139 using a restrained rubber gasket conforming to ASTM F 477. Solvent welded pipe joints are not permitted.

9-30.1(5)B Polyvinyl Chloride (PVC) Pipe (Under 4-inches)

Polyvinyl chloride (PVC) under 4-inches shall meet the requirements of ASTM D 2241. Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and shall have minimum wall thickness equal or greater than a standard dimension ratio (SDR) of 21. Pipe shall bear the National Sanitation Foundation Seal for use to transport potable water. Pipe shall be considered flexible conduit. Joints shall meet the requirements of ASTM D 3139 using a restrained rubber gasket meeting the requirements of ASTM F 477.

9-30.1(6) Polyethylene (PE) Pressure Pipe (4-inches and Over)

PE pressure pipe for water mains shall meet the requirements of ANIS/AWWA C906. Pipe materials shall be high-density polyethylene PE3408 conforming to a minimum cell class 345464 C, D or E per ASTM D 3350. Pipe diameter shall be either iron pipe size per Table 3 and Table 5 or ANSI/AWWA C906. Pipe pressure class shall be as listed in Table 9 of ANSI/AWWA C906 for DR 9 PE3408 material.

9-30.2 Fittings

Bolts, nuts, and washers used for securing fittings shall be of similar materials. Steel bolts shall meet the requirements of ASTM A 307 or ASTM F 568 for carbon steel or ASTM F 593 or ASTM F 738 for stainless steel. Nuts shall meet the requirements of ASTM A 563 or ASTM A 563 for carbon steel or ASTM F 594 or ASTM F 836 for stainless steel. Iron bolts and nuts shall meet the requirements of ASTM A 536, grade 65-45-12.

9-30.2(1) Ductile Iron Pipe

Fittings for ductile iron pipe shall meet the requirements of AWWA C110 or AWWA C153. Joints shall meet the requirements of AWWA C111. Fittings shall be cement mortar lined, meeting the requirements of AWWA C104. Gaskets for flat faced or raised faced flanges shall be ⅛-inch thick neoprene having a durometer of 60 plus or minus 5 or $\frac{1}{16}$ cloth inserted. The type, material, and identification mark for bolts and nuts shall be provided.

9-30.2(2) Vacant

9-30.2(3) Vacant

9-30.2(4) Steel Pipe

9-30.2(4)A Steel Pipe (6-inches and Over)

Fittings for steel pipe 6-inches and larger shall be bell and spigot or welded to match the pipe joints. Welded joints shall conform to AWWA C206. Field couplings shall be bolted, sleeve-type for plain-end pipe conforming to AWWA C219. Expansion joints shall be fabricated steel mechanical slip-type conforming to AWWA C221.

When flanges are required, they shall conform to AWWA C207. Linings and coatings for fittings shall be the same as specified for the adjacent pipe.

9-30.2(4)B Steel Pipe (4-inches and Under)

Fittings for steel pipe 4-inches and under shall be malleable iron threaded type with a pressure rating of 150 psi. Dimensions shall meet the requirements of ANSI B16.3. Threading shall meet the requirements of ANSI B2.1. Material shall meet requirements of ASTM A 47M, Grade 32510. Fittings shall be banded and hot-dip galvanized inside and out.

9-30.2(5) Polyvinyl Chloride (PVC) Pipe

9-30.2(5)A Polyvinyl Chloride (PVC) Pipe (4-inches and Over)

Fittings for PVC pipe shall be the same as specified for ductile iron pipe.

9-30.2(5)B Polyvinyl Chloride (PVC) Pipe (Under 4-inches)

Fittings for PVC pipe under 4-inches shall meet the requirements of ASTM D 2466.

9-30.2(6) Restrained Joints

The restraining of ductile iron pipe, fittings, and valves shall be accomplished by the use of either a bolted or boltless system. Any device utilizing round point set screws shall not be permitted.

All couplings installed underground to connect ductile iron or PVC pipe shall be manufactured of ductile iron.

9-30.2(7) Bolted, Sleeve-Type Couplings for Plain End Pipe

Bolted, sleeve-type couplings, reducing or transition couplings, and flanged coupling adapters used to join plain-end pipe shall meet the requirements of AWWA C219. Buried couplings to connect ductile iron, gray cast iron, or PVC pipe shall be ductile iron. Buried couplings for connecting steel pipe to steel pipe shall be steel.

9-30.2(8) Restrained Flexible Couplings

Restrained flexible couplings shall be locking type couplings in accordance with the Plans or Special Provisions. Any couplings that utilize set screws tightened against the outside pipe wall are not acceptable. Coupling shall be epoxy coated.

9-30.2(9) Grooved and Shouldered Joints

Grooved and shouldered joints shall conform to AWWA C606. Rigid or flexible grooved or shouldered joints shall be as specified in the Special Provisions.

9-30.2(10) Polyethylene (PE) Pipe (4-inches and Over)

Fittings for PE pipe shall meet the requirement of ANSI/AWWA C906. Pipe material shall be high-density polyethylene PE3408 conforming to minimum cell class 345464 C, D or E per ASTM D 3350. Pipe diameter shall be either iron pipe size per Table 3 and Table 5 of ANSI/AWWA C906 or ductile iron pipe size per Table 7 and Table 8 of ANSI/AWWA C 906. Pipe pressure class shall be as listed in Table 9 of ANSI/AWWA C 906 for DR 9 PE3408 material.

9-30.2(11) Fabricated Steel Mechanical Slip-Type Expansion Joints

Fabricated steel mechanical slip-type expansion joints shall meet the requirements of ANSI/AWWA C 221. Buried Expansion joints to connect ductile iron or PVC pipe shall be ductile iron. Buried expansion joints for connecting steel pipe to steel pipe shall be steel.

9-30.3 Valves

Valves shall be provided with hand wheels or operating nuts as designated. Where operating nuts are called for, a standard 2-inch operating nut shall be furnished. Valves shall be nonrising stem type, open counterclockwise, and be equipped with an O ring stuffing box.

9-30.3(1) Gate Valves (3-inches to 16-inches)

Gate valves shall meet the requirements of AWWA C509 or AWWA C515. Gate valves 16-inches in size shall be arranged for operation in the horizontal position by enclosed bevel gearing.

Prior to shipping, three certified copies of performance tests, as specified in Section 6 of AWWA C509 or Sections 5 and 6 of AWWA C515, shall be submitted to the Engineer for review.

9-30.3(2) Vacant

9-30.3(3) Butterfly Valves

Butterfly valves shall be rubber seated and shall meet the requirements of AWWA C504, Class 150B. Butterfly valves shall be suitable for direct burial.

Valve operators shall be of the traveling nut or worm gear type, sealed, gasketed, and permanently lubricated for underground service. Valve operators shall be constructed to the standard of the valve manufacturer to withstand all anticipated operating torques and designed to resist submergence in ground water.

The Contractor shall provide an affidavit of compliance stating that the valve furnished fully complies with AWWA C504.

9-30.3(4) Valve Boxes

Valve boxes shall be installed on all buried valves. The box shall be of cast iron, two piece slip type standard design with a base corresponding to the size of the valve. The box shall be coal tar painted by the manufacturer using its standard. The cover shall have the word “WATER” cast in it.

9-30.3(5) Valve Marker Posts

Posts shall have a 4-inch minimum square section and a minimum length of 42-inches, with beveled edges and shall contain at least one No. 3 bar reinforcing steel.

The exposed portion of the marker posts shall be coated with two coats of concrete paint in a color selected by the Contracting Agency.

The size of the valve and the distance in feet and inches to the valve shall be stenciled on the face of the post, using black paint and a stencil which will produce letters 2-inches high.

9-30.3(6) Valve Stem Extensions

Valve stem extensions shall have a 2-inch square operating nut and self-centering rockplate support. Valves with an operating nut more than 4-feet below grade shall have a valve stem extension to raise the operating nut to within 36-inches of the ground surface.

9-30.3(7) Combination Air Release/Air Vacuum Valves

Combination air release/air vacuum valves shall be designed to operate with potable water under pressure to permit discharging a surge of air from an empty line when filling and relieve the vacuum when draining the system. The valves shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body designed to withstand 300 psi.

The body and cover shall be cast iron conforming to ASTM A 48, Class 30. Floats shall be stainless steel conforming to ASTM A 240 and designed to withstand 1,000 psi. Seats shall be Buna N rubber. Internal parts shall be stainless steel or bronze.

9-30.3(8) Tapping Sleeve and Valve Assembly

Tapping valves shall be furnished with flanged inlet end connections. The outlet ends shall conform in dimensions to the AWWA Standards for hub or mechanical joint connections, except that the outside of the hub shall have a large flange for attaching a drilling machine. The seat opening of the valve must permit a diameter cut no less than ½-inch smaller than the valve size. Valves specifically designed for tapping meeting the requirements of AWWA C500, and valves meeting the requirements of AWWA C509, will be permitted. Tapping valves shall be of the same type as other valves on the project. Tapping sleeves shall be cast iron, ductile iron, stainless steel, epoxy coated steel, or other approved material.

9-30.4 Vacant

9-30.5 Hydrants

Fire hydrants shall conform to AWWA C502 and shall be of standard manufacture and of a pattern approved by the Contracting Agency.

9-30.5(1) End Connections

The end connections shall be mechanical joint or flanged, meeting the requirements of AWWA C110 and C111.

9-30.5(2) Hydrant Dimensions

Hydrant connection pipes shall be 6-inches inside diameter with 6-inch auxiliary gate valves. Barrels shall have a 7-inch minimum inside diameter. Hydrant length, measured from the bottom of the hydrant to the sidewalk ring, shall provide proper cover at each installed location. Valve openings shall be 5¼-inches minimum diameter. Hydrants shall have two 2½-inch hose nozzles and one pumper nozzle to match Contracting Agency's connection requirements.

Nozzles shall be fitted with cast iron threaded caps with operating nuts of the same design and proportions as the hydrant stem nuts. Caps shall be threaded to fit the corresponding nozzles and shall be fitted with suitable neoprene gaskets of positive water tightness under test pressures. The direction of opening shall be counterclockwise and shall be clearly marked on the operating nut or hydrant top. Hydrants shall be with O ring stem seals. The hydrant shall be painted with two coats of paint to match the owner's existing hydrants.

9-30.5(3) Hydrant Extensions

Hydrant extensions shall have a 6¾-inch minimum inside diameter and shall be gray cast iron or ductile iron and shall conform to the AWWA Standards for such castings. The drillings of the connecting flanges on the extensions shall match the drillings of the flanges on the hydrant.

Hydrant extensions shall also include the necessary hydrant operating stem extensions.

9-30.5(4) Hydrant Restraints

Shackle rods shall be ¾-inch diameter with threaded ends, and shall be ASTM A 36 steel. Shackle rods shall be coated with two coats of asphalt varnish. If a restrained joint system is used, it shall meet the requirements of Section 9-30.2(6).

9-30.5(5) Traffic Flange

Hydrants shall be provided with a traffic flange and shall be equipped with breaking devices at the traffic flange which will allow the hydrant barrel to separate at this point with a minimum breakage of hydrant parts in case of damage. There shall also be provided at this point, a safety stem coupling on the operating stem that will shear at the time of impact.

9-30.5(6) Guard Posts

Guard posts for hydrants shall be provided where shown in the Plans. Guard posts shall be reinforced concrete having a compressive strength of 3,500 psi and shall be 6-feet in length by 9-inches in diameter. Reinforcing shall consist of a minimum of five No. 3 deformed steel bars.

9-30.6 Water Service Connections (2-inches and Smaller)

9-30.6(1) Saddles

Saddles shall be ductile iron, bronze, brass, or stainless steel.

Saddles used for ¾-inch and 1-inch services shall be single strap and may be either AWWA tapered thread or female iron pipe thread outlet. Saddles used for 1½-inch and 2-inch services shall be double strap and shall be female iron pipe thread outlet. Saddles used on PVC pipe shall be formed for PVC pipe and have flat, stainless steel straps.

9-30.6(2) Corporation Stops

Corporation stops shall be made of bronze or brass alloy.

Corporation stops for direct tapping shall have AWWA tapered thread inlet and an outlet connections compatible with either copper or polyethylene tubing.

Corporation stops used with ¾-inch and 1-inch outlet saddles shall have either AWWA tapered thread or male iron pipe thread inlets and outlet connections compatible

with either copper or polyethylene tubing. Thread patterns for the saddle outlet and corporation stop inlet shall be the same.

Corporation stops used with 1½-inch and 2-inch outlet saddles shall have male iron pipe thread inlets and outlet connections compatible to connecting service pipes or have male iron pipe thread outlets.

9-30.6(3) Service Pipes

9-30.6(3)A Copper Tubing

Copper pipe or tubing shall be annealed, seamless, and conform to the requirements of ASTM B 88, Type K rating.

9-30.6(3)B Polyethylene Tubing

Polyethylene tubing shall meet the requirements of AWWA C901. Tubing shall be high molecular mass with a 200 psi rating. Tubing used for ¾-inch and 1-inch shall be either SIDR 7 (iron pipe size) or SDR 9 (copper tube size). Tubing used for 1½-inches and 2-inches shall be SDR 9 (copper tube size).

9-30.6(4) Service Fittings

Fittings used for service connections shall be made of bronze or brass alloy.

Fittings used for copper tubing shall be either compressions or flare type.

Fittings used for polyethylene tubing shall be either compression or stab type. Stab type fittings shall utilize an internal grip ring and O ring seal. Stainless steel liners shall be used when utilizing compression fittings on polyethylene tubing.

9-30.6(5) Meter Setters

Meter setters shall be manufactured and tested in accordance with all applicable parts of AWWA C800.

Meter setters shall have an angle meter stop with drilled padlock wing, an angle check valve, measure 12-inches in height, and shall have an inlet and outlet threads compatible with fittings connecting to service pipes.

Meter setters for ⅝-inch by ¾-inch, ¾-inch, and 1-inch services shall have meter saddle nuts for installation and removal of the meter.

Meter setters for 1½-inch and 2-inch services shall be equipped with a locking bypass.

9-30.6(6) Bronze Nipples and Fittings

Bronze threaded nipples and fittings shall meet the requirements of ANSI B-16.15, ASA 125 pound class.

9-30.6(7) Meter Boxes

Meter boxes and covers located in the non-traffic areas shall be constructed of either reinforced concrete or high-density polyethylene. High-density polyethylene meter boxes and covers shall have a tensile strength conforming to ASTM D 638. Meter box covers shall include a reading lid.

Meter boxes located in traffic areas shall be constructed of reinforced concrete, cast iron, or ductile iron. Traffic covers shall be constructed of aluminum, steel, cast iron, or ductile iron. Meter boxes and covers shall be designed for H-20 loading.